

90642



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NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA



For Supervisor's use only

Level 3 Statistics and Modelling, 2010

90642 Calculate confidence intervals for population parameters

Credits: Three

9.30 am Monday 15 November 2010

Check that the National Student Number (NSN) on your admission slip is the same as the number at the top of this page.

Make sure you have a copy of the Formulae and Tables Booklet L3–STATF.

You should answer ALL the questions in this booklet.

Show ALL working for ALL questions.

If you need more space for any answer, use the page(s) provided at the back of this booklet and clearly number the question.

Check that this booklet has pages 2–7 in the correct order and that none of these pages is blank.

YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.

For Assessor's use only		Achievement Criteria	
Achievement		Achievement with Merit	Achievement with Excellence
Calculate confidence intervals for population parameters.	<input type="checkbox"/>	Demonstrate an understanding of confidence intervals.	<input type="checkbox"/>
		Demonstrate an understanding of the theory behind confidence intervals.	<input type="checkbox"/>
Overall Level of Performance		<input type="checkbox"/>	

You are advised to spend 35 minutes answering the questions in this booklet.

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QUESTION ONE

A fertiliser company is trialling two different tomato fertilisers, Fertiliser A and Fertiliser B, to see their effect on tomato weight. When the tomato plants are fully grown, the tomato crop is harvested.

The weights of the tomatoes from a random sample of 30 tomato plants that have been fertilised with Fertiliser A have a mean of 139.1 g and a standard deviation of 7.1 g. The weights of the tomatoes from a random sample of 25 tomato plants that have been fertilised with Fertiliser B have a mean of 134.4 g and a standard deviation of 5.3 g.

Let μ_1 be the mean weight of tomatoes grown using Fertiliser A, and let μ_2 be the mean weight of tomatoes grown using Fertiliser B.

- (a) Find a 95% confidence interval for $\mu_1 - \mu_2$.

- (b) Explain what this confidence interval indicates about how Fertiliser A affects tomato weights compared with how Fertiliser B affects tomato weights.

- This time the sample of tomatoes grown using Fertiliser A had a mean weight of 138.5 g and a standard deviation of 6.8 g. The sample of tomatoes grown using Fertiliser B had a mean weight of 135.2 g and a standard deviation of 6.1 g.

Let μ_1 be the mean weight of tomatoes grown using Fertiliser A, and let μ_2 be the mean weight of tomatoes grown using Fertiliser B.

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- (ii) Compare the confidence interval in (i) with the confidence interval you calculated in part (a).

[illegible]

- (d) *Totally Tomatoes* sell tomatoes at the local market in boxes of 6. Tomatoes are packed into boxes independently of each other, and records show that the weights of the individual tomatoes are normally distributed with a mean of 135.2 g and a standard deviation of 5.8 g.

Calculate a 95% confidence interval for T , the total weight of a box of 6 tomatoes packed by *Totally Tomatoes*.

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QUESTION TWO

Fabulous Foods conducted a survey which included a question on preference for brands of tomato sauce. They surveyed 200 of their customers, at random, and found that 51% of those customers surveyed preferred *Tangy Ruby Tomato Sauce* over all other brands.

- (a) Find a 90% confidence interval for the proportion of all *Fabulous Foods*' customers that preferred *Tangy Ruby Tomato Sauce*.

- (b) The marketing department is instructed to conduct another survey that has 3% as its margin of error, at a 95% confidence level.

Find the number of customers that they should survey to obtain this margin of error.

- Explain what effect using the recalculated proportion of 26% has on the standard error of the proportion.

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**Extra paper for continuation of answers if required.
Clearly number the question.**

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Question
number

